

An Introduction to Applied Analysis

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Projected List of Chapters

The approach to analysis taken in this text was inspired by my experience with the computational finance students, who need a certain level of rigor but do not need to explore the various topics as deeply as would a mathematics graduate student. (For example, compactness and uniform continuity are not covered.) I hope that the text may find a market among Ph.D. programs in areas such as economics, physics, or engineering. Such topics as function limits, continuity, and differentiability are developed with no reference at all to sequences. The treatment is rigorous, but the flavor differs from most analysis texts in that much informal discussion is used in attempts to elucidate the definitions. The omission of a rigorous development of sequences and series is a choice meant to simplify the foundation laid in chapters 0 through 6. The hope is that by the time the students get to chapter 7, they have formed a good sense of what may safely be assumed and what must be argued from first principles; appealing to this sense, we declare at the beginning of chapter 7 that basic knowledge of sequences and series may be assumed.

0. Principles of Logic and Axiomatics
1. Finite and Infinite Sets
2. Limits of Functions
3. Continuity
4. Differentiability
5. Integration
6. Convex Functions
7. Analyticity and Taylor Polynomials
8. Elimination Algorithms for Linear Systems
9. Structure of Cartesian Space
10. Orthogonality and Invertibility
11. Eigenbases and Symmetric Matrices
12. Convex Sets and Multivariate Convex Functions
13. Lagrange Multipliers
14. Improper Integrals
15. Lebesgue Measure
16. Lebesgue Integration